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Professional Preparation

- Ph.D. Univ. of Colorado, Department of Geography, 2004
Environmental Policy Certificate, Univ. of Colorado Policy Sciences Committee, 1999
M.S. University of Delaware, Oceanography, 1989
A.B. University of Chicago, Geophysical Sciences, 1985

Appointments

- Physical Scientist (1999-present) NOAA-OAR Earth Systems Research Lab, Physical Sciences Division (formerly the Climate Diagnostics Center), Boulder, CO
Affiliate Faculty (2008-present) University of Colorado Environmental Studies Program, Boulder, CO
Marine Science Policy Analyst (1997-1999), NOAA-OAR Environmental Research Labs, Boulder, CO
Marine Science Policy Analyst (1995-1997), NOAA-OAR Program Development & Coordination, Silver Spring, MD
Climate & Research Programs Specialist (1994-1995), NOAA Office of Policy & Strategic Planning, Washington, DC
Marine Science Policy Analyst (1991-1994), NOAA-OAR Program Development & Coordination Office, Silver Spring, MD
John D. Knauss Marine Policy Fellow (1990), Office of the Oceanographer of the Navy, Washington, DC

Publications:

- Ray, AJ. 2016. Providing climate science to real-world policy decisions: a scientist's view from the trenches. pp.141-160 in: *Water Policy and Planning in a Variable and Changing Climate*. Editors: Kathleen Miller, Alan Hamlet, Douglas Kenney, Kelly T. Redmond. CRC Press.
- Ray, AJ, and RS Webb. 2016. Understanding the user context: decision calendars as frameworks for linking climate to policy, planning and decision-making. Pp 27-50 n: *Climate in Context: Lessons learned from the RISA Program*, Parris, A, et al, eds. Wiley & Sons.
- Gordon, E., Dilling, L, McNie, E, Ray, AJ. 2016. Navigating Scales of Knowledge and Decision Making in the Intermountain West: Implications for Science Policy. In: *Climate in Context: Lessons learned from the RISA Program*, Parris, A, et al, eds. Wiley & Sons.
- Ballard, Tristan, Richard Seager, Jason E. Smerdon, Benjamin I. Cook, Andrea J. Ray, Balaji Rajagopalan, Yochanan Kushnir, Jennifer Nakamura, and Naomi Henderson, 2014: Hydroclimate Variability and Change in the Prairie Pothole Region, the “Duck Factory” of North America. *Earth Interact.*, 18: 1–28.
- Ray, AJ, Liebmann, Brant, and Allured, D.A. 2014. Climate Analysis, Chapter 7 in Wyoming Basin Rapid Ecoregional Assessment, USGS report to the US Bureau of Land Management, USGS Open-File Report 2015-1155.
<http://pubs.er.usgs.gov/publication/ofr20151155>.

- Barsugli, JJ, G Guentchev, RM Horton, A Wood, LO Mearns, XZ Liang, JA Winkler, K Dixon, K Hayhoe, RB Rood, L Goddard, AJ Ray, L Buja, C Ammann. 2013. The Practitioner's Dilemma: How to Assess the Credibility of Downscaled Climate Projections. *Eos, Transactions American Geophysical Union* 94 (46), 424-425.
- Cayan, Daniel, et al. 2013. *Future Climate: Projected Average*. In Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 101–125. A report by the Southwest Climate Alliance. Washington, DC: Island Press.
- Gershunov, A, et al. 2013. *Future Climate: Projected Extremes*. In Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 126–147. A report by the Southwest Climate Alliance. Washington, DC: Island Press.
- Carr, N.B., Garman, S.L., Walters, A, Ray, AJ, Melcher, C.P., Wesner, J.S., O'Donnell, M.S., Sherrill, K.R., Babel, N.C., and Bowen, Z.H., 2013: *Wyoming Basin Rapid Ecoregional Assessment work plan*. USGS Open-File Report 2013–1223, 58 p.
- McWethy, David B. et al. 2010. *Climate and Ecosystem Change in the U.S. Rocky Mountains and Upper Columbia Basin: Historic and Future Perspectives for Natural Resource Management*. USGS Natural Resource Report NPS/GRYN/NRR—2010/260. 97pp.
- Ray, AJ, JJ Barsugli, Jr., Klaus E Wolter, Jon K. Eischeid. 2010. *Rapid-Response Climate Assessment to Support the FWS Status Review of the American Pika*. NOAA Report to the U.S. Fish and Wildlife Service. 53pp. www.esrl.noaa.gov/psd/news/2010/020210.html
- Rajagopalan, B, K Nowak, J Prairie, MP Hoerling, B Harding, JJ Barsugli, AJ Ray, & B Udall. 2009. Water Supply Risk on the Colorado River: Can Management Mitigate? *Water Resources Research*, 45: W08201, doi:10.1029/2008WR007652.
- Lowery, JL, AJ Ray, RS Webb. 2009. Factors Influencing the Use of Climate Information by Colorado Municipal Water Managers. *Journal of Climate Research*, 40: 103-119.
- Kenney, D., A.J. Ray, B. Harding, R.S. Pulwarty, B. Udall, 2008. Rethinking Vulnerability on the Colorado River. *Journal of Contemporary Water Research and Education*. 40:103-119.
- Ray, AJ, JJ Barsugli, KB Averyt, KE Wolter, MP Hoerling, 2008. *Colorado Climate Change: A Synthesis To Support Water Resource Management and Adaptation*, a report for the Colorado Water Conservation Board by the NOAA-CU Western Water Assessment, available at: http://www.colorado.edu/publications/reports/WWA_ClimateChangeColoradoReport_2008.pdf
- Ray, AJ, GM Garfin, RVarady, et al. 2007. Monsoon Region Climate Applications: Integrating Climate Science with Regional Planning and Policy, *BAMS*, 88:933–935.
- Ray, AJ, GM Garfin, M Wilder, M Vásquez-León, M Lenart, and AC Comrie, 2006. Applications of monsoon research: Opportunities to inform decisionmaking and reduce regional vulnerability. *Journal of Climate*, 20: 1608–1627.
- Ray, AJ 2003. Reservoir management in the Interior West: the influence of climate variability and functional linkages of water. Pp 193-217 in *Climate, water, and transboundary challenges in the Americas*, Henry Diaz and Barbara Morehouse, eds. Kluwer Press.

Other publications:

- Ray, AJ. 2005-2009. Lead editor of the “Intermountain West Climate Summary,” a product of the Western Water Assessment (WWA) RISA; wrote/co-authored numerous feature

articles, focus pages, and technical discussions.

<http://www.colorado.edu/climate/iwcs/archives>

Ray, AJ, 2008. Water Resources Decision-Makers and their needs for Decadal Climate Prediction, US CLIVAR Variations Newsletter, Oct 2008.

Ray, AJ, JJ Barsugli, and T Hamill. 2007. Integrating assessments of user needs with weather research: Developing user-centric tools for reservoir management. AMS 16th Conf on Applied Climatology: Extended Abstracts. Boston: AMS.

Ray, AJ, N Schmidt, BJ Morehouse, and RS Webb, 2003: Report on Research Opportunities for Climate and Society Interactions in the North American Monsoon Region. Workshop on Applications and Human Dimensions of Monsoon Research 18-20 June 2001, Tucson, AZ, Institute for the Study of Planet Earth, University of Arizona, 42 pp.

Interagency Ecosystem Management Task Force, 1995: *Science and Information Issues Chapter*, Prince William Sound Ecosystem Management Case Study, for the White House Ecosystem Management Assessment

Interagency Ecosystem Management Task Force, 1995: *Institutional and Management Issues Chapter*, Great Lakes Ecosystem Management Case Study for the White House Ecosystem Management Assessment

Ray, A.J., and D. Atwood, eds. 1993. Report of the NOAA Workshop of Coral Ecosystem Research and Monitoring, NOAA Coastal Ocean Program & Office of Global Programs.

Consultation/advising to government bodies

PI has been interacting for over 3 years with Department of Interior colleagues to connect climate science with DOI interests, including serving on the Steering Committee of the DOI Great Northern Landscape Conservation Cooperative. The PI works to connect climate science and applications across the country, with funding from NOAA, the US Fish and Wildlife Service and Bureau of Reclamation, and the State of Colorado. Currently, she is working with NOAA/National Marine Fisheries Service working to incorporate risks of climate change into the Federal Energy Regulatory Commission planning process for licensing or re-licensing dams. Her prior work includes successfully leading work to synthesize climate science for applications for water and endangered species (Ray et al. 2008 and 2010). Via the National Climate Prediction and Projection Platform (NCP), she is developing applications activities for NOAA National Marine Fisheries in several regions, and a pilot project with the DOI North Central-Climate Science Center. The PI also has used institutional and decision analyses tools in work studying USBR and stakeholders in its reservoir management decisions (Ray 2003, 2004) and this work has guided efforts by NOAA/ESRL and the Western Water Assessment RISA to connect climate science with water managers.

Synergistic Activities

1. Member, CLIVAR Predictions, Predictability and Applications Interface Panel, 2013-2016 term.
2. Member, American Meteorological Society Committee on Climate Services.
3. Steering Committee, DOI Great Northern Landscape Conservation Cooperative, Bozeman, MT; Science Steering Committee, Nature Conservancy Canyonlands Research Center, Moab, UT.
4. Co-Chair, NOAA Needs Assessment for Changes in Weather and Climate Extremes (2011-13), to link science to societal challenges and to prioritize research and services to address these

5. National Climate Projections Pilot (NCP), Core Team and Science Applications Lead (2010-2013), a NOAA-led effort to transition climate projections from research to service.
6. Advisory Committee for Post-docs Applying Climate Expertise (PACE) Erin Towler, USGS-NCAR, 2010-2012. Mentor for four NOAA Hollings Undergraduate Scholars, summers 2007-9.
7. Participant, NOAA/CIRES Western Water Assessment RISA, funded by NOAA/CPO, (1998-present) worked on the interaction climate and multi-purpose reservoir management in several western reservoir systems, municipal water management and climate, and edited a regularly issued "Intermountain West Climate Summary" from 2005-2009. Organized numerous WWA-sponsored workshops for water and other natural resource managers for two-way communication about climate and weather products and research.
8. Member of the Science Working Group for the North American Monsoon Experiment (NAME), 2000-08.
9. Co-Program Manager for NOAA Pan American Climate Studies (PACS) from 1995-2000, \$5.3M research program to improve predictions for seasonal climate over the Americas.

Conferences, Workshops and Symposia Convened

- Organizing Committee for workshops: 40th Climate Diagnostics and Prediction Workshop, Oct 2015, Boulder, CO; USGS-NOAA Gulf of Mexico Climate Data and Scenarios Workshop, Baton Rouge, LA, May 2012; NCAR Community Earth System Model Societal Dimensions Workshop, May 2011; AMS Summer Community Meeting, August 2011; 2011 and 2013 Climate Prediction Applications Science Workshops (CPASW)
- Co-Convenor of professional society sessions connecting climate science and other disciplines: i) Symposium on Understanding and Responding to Climate Change Impacts on Marine and Coastal Fisheries, at the American Fisheries Society Annual Meeting, Seattle, WA, Sept 2011; ii) Advancing Climate Science for Wildlife Management: From Impacts And Uncertainty To Decisions, The Wildlife Society Annual Meeting, October 2010, Snowbird, UT, iii) Human Dimensions of Climate Variations in the Americas, AGU-Mexican Geophysical Union Joint Assembly, May 2007, Acapulco, MX.
- Co-organized two binational workshops on Monsoon Region (2001 and 2006), the "Regional Climate Forum for Northwest Mexico and the Southwest U. S.," Ensenada, MX, April, 2008, and the Workshop on Applications and Human Dimensions of Monsoon Research, Tucson, AZ, 18-20 June 2001.
- Numerous sessions at AGU, AMS, the NOAA Climate Prediction Assessment Workshops, e.g. at the 2013 CPASW, organized a panel discussion of ecosystem and public lands managers to discuss their needs for climate information across time scales; and at the 2014 AGU, "Coming Attractions: Climate Services in the Western U.S"
- As part of the Western Water Assessment RISA, organized numerous WWA-sponsored workshops for water and other natural resource managers for two-way communication about climate and weather products and research, including: WWA Climate workshops for water managers, Golden, Colorado and Cheyenne, Wyoming (Fall 2005), and Colorado River Basin Outlook briefing for water managers, decision makers, and planning groups in the region in Salt Lake City, UT (November 2004)

Professional Development

- Detail to OAR Policy Planning and Evaluation Office, Jan-July 2010

- NOAA/OAR Leadership Effectiveness and Advancement (LEAP) program, 2010-11
- NOAA Leadership Seminar, Airlie, VA, Summer 2008
- WAS*IS, Weather and Society Integrated Studies workshop participant, Summer 2006
- Inter-Americas Institute for Global Change Research Summer Institute in Interdisciplinary Global Change Science, 11-30 July, 1999, Miami, FL
- RiverWare, Introduction to Simulation Modeling (Jul '00) and Introduction to Rules-based Simulations (Dec '00), University of Colorado Center for Advanced Decision Support for Water and Environmental Systems